PATENT ABSTRACTS OF JAPAN

(11) Publication number : 05-025763
(43) Date of publication of application : 02.02.1993

(51) Int.Cl. D04H 1/46
A47L 13/16
D03D 9/00
D04H 1/48

(21) Application number : 03-171386
(22) Date of filing : 11.07.1991

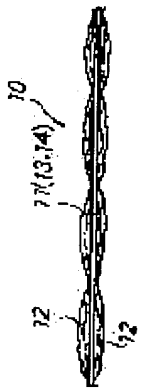
(71) Applicant : KAO CORP
(72) Inventor : SATO SHINYA
MASUKI TETSUYA
SAITO YUTAKA
YANAGIDA HIROYUKI
YUASA OSAMU

(54) BULKY SHEET AND PRODUCTION THEREOF

(57) Abstract:

PURPOSE: To produce a bulky sheet having good skin touch, excellent strength and excellent flexibility and useful for sanitary articles, etc., by laminating a fiber web to the surface of a thermally shrinkable net-like sheet, interlacing, heating and thermally shrinking the laminate.

CONSTITUTION: One or more fiber webs are laminated to the surface or both the surfaces of a thermally shrinkable net-like sheet 11 such as a PE sheet, and the constituting fibers of the fiber web and the constituting fibers of the net-like sheet or the fiber web are interlaced each other to convert the fiber web into a nonwoven fabric like fiber aggregate 12 and simultaneously integrate the fiber web with the net-like sheet 11, followed by thermally shrinking the integrated sheet to produce the objective bulky sheet 10 in which depressions and projections are formed over the whole surface of the nonwoven fabric like fiber aggregate.



LEGAL STATUS

[Date of request for examination] 14.10.1997

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application

other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3096094

[Date of registration] 04.08.2000

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the loft sheet used for facing or a cushioning material in the loft sheet with which the front face of a sheet forms the shape of toothing, a cleaning sheet especially business-use or for home use, toilet material, and sanitary goods etc., and its manufacture method.
[0002]
[Description of the Prior Art] There is a formal thing which bundled the thing of the shape of a simple sheet, such as a dustcloth which is wet or the dry-type wiping cloth for cleaning using textile fabrics, the nonwoven fabric, etc. as a cleaning sheet, and a chemistry dustcloth, or the thing of the filamentose represented by the mop, and it is widely used at a home, an office, a store, a building, works, etc. according to the purpose.
[0003] In the sheet for cleaning, in order to be involved and to hold big dust moreover, the flexibility of fiber is large and the sheet which had a practical strength further is required. Rather than the nonwoven fabric from which only weld was constituted by only adhesion, the nonwoven fabric generally formed by interlacement of fiber has the large flexibility of composition fiber, and twines fiber as dust and this fiber, and retentivity becomes very high. Therefore, the degree of fiber interlacement influences the retentivity of dust greatly. That is, if interlacement becomes strong too much, the flexibility of fiber will fall, the retentivity of dust gets worse, if interlacement is too weak conversely, the intensity as a nonwoven fabric will fall remarkably, and while processability gets worse, it becomes easy to produce defluxion of fiber.
[0004] as technology which gives the shape of toothing to a sheet on the other hand, although the technology which forms irregularity in a sheet by putting paper or a nonwoven fabric by the embossing roll is known, when the shape of toothing cannot be maintained for a long time and a tensile stress joins the bottom of existence of ****** with this conventional loft sheet, the maintenance which has the shape of toothing formed at once is also difficult
[0005] As an example which solved these problems, as it is in JP,64-61546,A, gathers are formed by giving stitching (sewing up) with the thread which had elasticity in the nonwoven fabric, and there are some which have given the shape of toothing. However, since the loft is not given to the nonwoven fabric itself which forms gathers compulsorily with elastic yarn and constitutes a sheet from this Prior art, flexibility is missing.
[0006] Moreover, by joining partially and heating the non-thermal-contraction nature fiber and potential crimp manifestation fiber which constitute a nonwoven fabric in JP,61-215754,A and JP,2-160962,A, the shape of toothing is made to discover and the technology of manufacturing a loft sheet is indicated. Although the portion which consists of non-thermal-contraction nature fiber of the nonwoven fabric of the sheet obtained by these methods discovers the shape of bulky toothing, however, the irregularity to discover The potential crimp manifestation fiber layer which constitutes a sheet becoming upright, and having un-arranged [of the flexibility of the sheet itself falling remarkably], since it is limited to comparatively small irregularity and the layer which consists of potential crimp manifestation fiber will

be in the state where the density of fiber is still higher.
[0007]
[Problem(s) to be Solved by the Invention] However, a limitation is in the size of the shape of ** et al. and toothing discovered by the conventional method mentioned above, and since the flexibility of composition fiber is lost since there is much fiber fixed to the potential crimp manifestation fiber layer which makes irregularity discover, or a portion with the high density of fiber exists continuously, the flexibility and touch nature which are obtained by the bulky portion may be checked. Moreover, even if the shape of toothing is given to a sheet, the nonwoven fabric itself which constitutes a sheet has some which have not become in bulky. On the other hand, generally, a bulky nonwoven fabric's having little interlacement of composition fiber, and having un-arranged [that become weak and the intensity of a nonwoven fabric falls remarkably].
[0008] Therefore, the purpose of this invention has predetermined intensity, and is flexible and is to offer the good loft sheet and its manufacture method of the touch.
[0009]
[Means for Solving the Problem] The nonwoven blanket-like fiber aggregate by which this invention was formed in one side or both sides of a reticulated sheet by interlacement of fiber attains the above-mentioned purpose, when it is unified in the state of interlacement also to this reticulated sheet with interlacement between the composition fiber and the above-mentioned fiber aggregate offers the loft sheet characterized by forming much irregularity which becomes the front face from a reticulated sheet size.
[0010] Moreover, after this invention carries out the laminating of the fiber aggregate to one side or both sides of a reticulated sheet of thermal-contraction nature, The composition fiber of the composition fiber of the above-mentioned fiber aggregate, a reticulated sheet, or the above-mentioned fiber aggregate is made to interlace. By heating these and carrying out the thermal contraction of the above-mentioned reticulated sheet, after the unification with a reticulated sheet is made, as soon as this fiber aggregate serves as a nonwoven blanket-like fiber web The above-mentioned purpose is attained by offering the manufacture method of the loft sheet characterized by covering the nonwoven blanket-like whole fiber web, and giving the shape of toothing.
[0011] In this invention, since irregularity is not substantially formed only by contracting a reticulated sheet, and the fiber aggregate does not carry out contraction substantially and it unites with the reticulated sheet, the concavo-convex section of bigger a large number than a reticulated sheet is formed. In addition, the fiber aggregate puts what composition fiber is interlacing, and a fiber web puts the thing before interlacing with this invention.
[0012]
[Function] The fiber which constitutes the nonwoven blanket-like fiber aggregate in order that the reticulated sheet of thermal-contraction nature may contract, after the fiber of the fiber aggregate interlacing and forming a nonwoven blanket-like fiber web carries out an upheaval array wavelike, and since the shape of much toothing is given as the whole sheet and it becomes bulky, it becomes the sheet of the soft touch.
[0013] Moreover, although a tangle between the fiber which constitutes the nonwoven blanket-like fiber aggregate becomes comparatively soft, since the tensile strength as a sheet is also fully given by the reticulated sheet, the loft sheet of this invention can be used for the wide range purpose.
[0014]
[Example] While the nonwoven blanket-like fiber aggregate 12 formed in one side or both sides of the reticulated sheets 11, 13, and 14 by interlacement of fiber is unified in the state of interlacement also to these reticulated sheets 11, 13, and 14 with interlacement between the composition fiber like drawing 1 - drawing 4 , drawing 6 - drawing 8 , as for the loft sheet 10 of this example, much irregularity-like sections 12A and 12B are formed in the front face at the above-mentioned fiber aggregate 12.
[0015] The reticulated sheets 11, 13, and 14 are the large concepts containing the perforated film which has many holes, and contain the perforated film 14 which has many holes as shown in the potential crimp manifestation fiber web 13 and drawing 8 which formed the hole as shown in the network 11 and

drawing 7 which are shown in drawing 6 . Although it is formed in the shape of a grid as a whole as shown in drawing 6 when the network 11 of thermal-contraction nature is used as the above-mentioned reticulated sheet In the perforated film 14 which can deform various configurations of the hole formed in the reticulated sheets 11, 13, and 14 for example, which is shown in drawing 8 As shown in (a), it may be a round shape-like, as shown in (b), it may be a star type configuration, and as further shown in (c), you may combine a round shape and a star type.

[0016] As the above-mentioned fiber aggregate 12 is shown in drawing 3 and drawing 4 , the non-joint surrounded by the grid of a network 11 is formed as height 12A, and a part for a joint with a grid 13 is formed as concave section 12B. And the concavo-convex field which has a product made from a cushion by much height 12A and concave section 12B between these is formed in the above-mentioned fiber aggregate 12. Moreover, since the fiber aggregates which exist in a front rear face through a hole interlace strongly and it is hard to interlace the fiber of the shape of a film top or a grid with a puncturing film or a network when using the film which has puncturing as a reticulated sheet, and when using the thick or small network of puncturing of a wire size, when the fiber on a film or a grid upheaves contrary to the above-mentioned case, the shape of toothing is formed.

[0017] The front face of the fiber aggregate 12 is constituted by the fiber which carried out the confounding, and when especially used as a sheet for cleaning, it catches the fine dust which adhered to the cleaned field among these composition fiber. As for the network 11 as a reticulated sheet, it is desirable that the thing of thermal-contraction nature is used. as a network 11 of this thermal-contraction nature polyester systems, such as a polyolefine system, for example, polyethylene, polypropylene, and a polybutene, -- for example polyamide systems, such as a polyethylene terephthalate and a polybutylene terephthalate, -- for example Acrylonitrile systems, such as nylon 6 and Nylon 66, and a vinyl system, a vinylidene system, For example, these denaturation objects, such as a polyvinyl chloride and a polyvinylidene chloride, What contracts the network which consisted of thermoplastic polymer, such as alloys and such mixture, in one shaft or the biaxial direction according to the shape of required toothing, Or the filament which carries out a thermal contraction by above-mentioned polymer is used for either [at least] warp or the woof, and weaving or the composed network is desirable and selects suitably according to the shape of toothing to need.

[0018] As shown in drawing 8 as a reticulated sheet, when the film 14 which has puncturing is used, what gave puncturing to the film contracted to one shaft or biaxial by the above-mentioned polymer by punching etc. can be used. moreover, as a reticulated web which can also use the reticulated web 13 which consists of the fiber aggregate in which the hole as shown in drawing 7 as a reticulated sheet was formed, and consists of this fiber aggregate A monoolefin polymer and copolymers, such as ethylene, a propylene, and a butene, a high density polyethylene, a low density polyethylene, and a line -- a low density polyethylene -- Polypropylene, an ethylene propylene rubber, an ethylene vinylacetate copolymer, etc., An ester system polymer and copolymers, such as a polyethylene terephthalate and a polybutylene terephthalate, Vinyl systems, such as a polyvinyl chloride and a polyvinylidene chloride, a vinylidene system polymer, and a copolymer, Polyamide system polymers, such as nylon 6 and Nylon 66, and a copolymer, an acrylonitrile system polymer, and a copolymer, Or it consists of fiber of thermal-contraction nature which consists of such mixture or potential crimp manifestation fiber which a crimp discovers by heating, and such mixture, and those fiber is mutually unified in the state of interlacement.

[0019] The reticulated sheet 13 a fiber web by the high-speed liquid style or the airstream the fiber aggregate sheet which composition fiber is mutually interlaced while being formed in a reticulated gestalt, and has a reticulated pattern -- or the aperture of specification [the sheet-like object which composition fiber is mutually interlaced and is unifying], and a hole -- a **** fiber aggregate sheet by punching etc. by the pitch and the hole pattern **** this morning or the composition fiber built by the other method unifies by interlacement -- having -- **** -- a specific aperture and a hole -- if it is the reticulated sheet which has a pitch and a hole pattern, it is good anything

[0020] When using a network 11 as a reticulated sheet, it is necessary to determine the mesh, a wire size, a conductor spacing, a bore diameter, a hole pitch, a hole pattern, etc. in consideration of partial

interlacement nature with a shrinkage force, the configuration of the irregularity by the contraction, a degree, and the nonwoven blanket-like fiber aggregate etc. Specifically, a wire size is 20 micrometers preferably. -500micrometer It is 100 micrometers still more preferably. -200micrometer A conductor spacing is 4mm - 20mm still more preferably 2mm - 30mm preferably.
[0021] Moreover, when using the reticulated web 13 or a film 14 as a reticulated sheet, the diameter of puncturing is desirable and the crevice between 8mm - 20mm and puncturing is 4mm - 10mm still more preferably 2mm - 20mm still more preferably 4mm - 40mm. In addition, when using things other than the above as a reticulated sheet, an aperture etc. can be chosen according to the above-mentioned reticulated sheet.
[0022] Any of natural fibers, such as regenerated fibers, such as semi-synthetic fibers, such as super-thin fiber manufactured by thermoplastic fiber, such as a polyester system, a polyamide system, and a polyolefine system, or those composite-ized fiber, division fiber, or the melt BURON method and acetate, cuprammonium rayon, and rayon, or cotton (cotton), are sufficient as the kind of fiber aggregate 12, and those cotton-mixing is sufficient as it. The basis weight of the fiber aggregate which constitutes a nonwoven blanket-like fiber aggregate portion, fineness, fiber length, a cross-section configuration, the degree of slip, and intensity take processability, cost, etc. into consideration synthetically, and are determined in accordance with the purpose of use.
[0023] When it uses as a sheet for cleaning especially, according to a demand function, you may give suitably the surfactant which the surface physical properties are raised and sticks to dust, an oily medicine, or the oily medicine which gives gloss to the field cleaned at the nonwoven blanket-like fiber aggregate. Next, the desirable embodiment of the manufacture method of the loft sheet concerning this invention is explained.
[0024] As shown in drawing 1 and drawing 2 , after carrying out the laminating of the fiber aggregate 12 to one side or both sides of the reticulated sheets 11, 13, and 14 which carry out a thermal contraction to one shaft or 2 shaft orientations, The fiber of the fiber aggregate 12 which is in the one side side of the reticulated sheets 11, 13, and 14 by the stream, and the fiber of the fiber aggregate 12 which is in a side on the other hand, And as soon as it carries out the slip coalition of the fiber and the reticulated sheets 11, 13, and 14 of the fiber aggregate 12, each fiber aggregates 12 and 12 are used as the nonwoven blanket-like fiber web by interlacement. Then, simultaneous with dryness, or by carrying out the thermal contraction of the reticulated sheets 11, 13, and 14 of thermal-contraction nature independently, the obtained fiber web carries out the upheaval array of the composition fiber of a this nonwoven blanket-like fiber web wavelike, and, as for a dryness process, gives the shape of toothing as a whole.
[0025] That is, as shown in drawing 5 , the fiber aggregate 12 lets out through the delivery equipment 22 continuously from each of the carding machines 21A and 21B which make the fiber aggregate 12. On the other hand, the roll 23 of a network 11 is arranged among carding machines 21A and 21B, and the reticulated sheets 11, 13, and 14 let out from the delivery roll 25 of a roll 23.
[0026] And with the above-mentioned delivery roll 22, the fiber aggregate 12 piles up and it is carried in to water needling equipment 26 by the both sides of the reticulated sheets 11, 13, and 14. Here, fiber aggregate 12 comrades which are made to interlace the fiber of the fiber aggregate 12 with a reticulated sheet, and are in both-sides side of the reticulated sheets 11, 13, and 14 are made to interlace by the jet stream, and a sheet as shown in drawing 2 is produced.
[0027] The fiber aggregate 12 and the network 11 after interlacement pass along a nip roll 27, are carried in to dryness and the heating apparatus 28 for carrying out a thermal contraction, and are heat-treated. With this heat treatment, the reticulated sheets 11, 13, and 14 carry out a thermal contraction, and as shown in drawing 4 , height 12A and concave section 12B are formed in the nonwoven blanket-like fiber aggregate 12 interlaced on the reticulated sheets 11, 13, and 14. At the heating process by heating apparatus 28, it processes in moderate temperature and time to what unified the nonwoven blanket-like fiber aggregate 12 and the reticulated sheets 11, 13, and 14 of thermal-contraction nature. What is necessary is just to make it become a contraction for acquiring the convex configuration to need, although those conditions change with reticulated sheets 11, 13, and 14 of thermal-contraction nature. However, in the state of a continuous junction sheet, in case the flow direction of this sheet is shrunk,

the speed difference of the entrance side of the heat treatment section and an outlet side becomes the important point. That is, when tensile force is larger than contraction stress, as for the velocity ratio of order, doubling with the thing near the contraction to need is desirable. In the case of a continuation sheet state, you may roll round in the shape of a roll, it may be cut to succeedingly required length, and may be inserted in and packed if needed.

[0028] The web after heat treatment is rolled round by the winder 30 through a nip roll 29. In addition, the nonwoven blanket-like fiber web formed by interlacement of fiber The flexibility of the composition fiber is larger than the nonwoven fabric obtained by welding or pasting up fiber. Although the flexibility of the fiber of the nonwoven blanket-like fiber aggregate formed when the fiber aggregate interlaces also in the sheet of this invention is large, when the reticulated sheet of thermal-contraction nature contracts, the flexibility of the composition fiber of the nonwoven blanket-like fiber aggregate becomes still larger.

[0029] Therefore, the degree of fiber interlacement influences greatly the flexibility of the sheet after the reticulated sheet of thermal-contraction nature contracts, the flexibility of composition fiber, in the shape of toothing, etc. If interlacement is too weak, in case the reticulated sheet of thermal-contraction nature will contract, interlacement is solved and the shape of toothing cannot be given to a nonwoven blanket-like fiber web. Furthermore, the loft sheet of this invention is explained based on a concrete example.

[0030] They are 1.5 deniers of example 1 polyester fibers, and 51mm with the card of a conventional method Basis-weight 8 g/m2 After carrying out the network (9mm of conductor spacings, 0.2mm of wire sizes) in which forms the fiber aggregate, and wraps the fiber aggregate at five layers (40g/m2) (not shown), and polypropylene carries out biaxial contraction as a reticulated sheet to the interlayer and carrying out the laminating of this fiber aggregate to a vertical layer, it was made to interlace by water needling. For the water pressure of water needling, 40 kg/cm2 and a nozzle pitch are 1.6mm and speed 5 m/min in that case. It carried out. Then, by 130-degree C hot blast, by heat-treating for 50 seconds, the network was shrunk simultaneously with dryness and the contraction obtained lengthwise and the longitudinal direction, and the loft sheet that both has about 10% of irregularity.

[0031] In addition, a contraction is called for from the following formulas.

Contraction = (X-Y) (/X) in the x100% above-mentioned formula, X is a length of one side in front of a thermal contraction, and Y is a length of one side after a thermal contraction.

They are 1.5 deniers of example 2 rayon fiber, and 51mm with the card of a conventional method Basis-weight 8 g/m2 After carrying out the network (9mm of conductor spacings, 0.2mm of wire sizes) in which forms the fiber aggregate, and wraps the fiber aggregate at ten layers (basis-weight 80 g/m2) (not shown), and the polypropylene as a reticulated sheet carries out biaxial contraction to the lower layer and carrying out the laminating of this fiber aggregate to the upper layer, it was made to interlace by water needling. For the water pressure of water needling, 40 kg/cm2 and a nozzle pitch are 1.6mm and speed 5 m/min in that case. It carried out. Then, by heat-treating for 60 seconds at 130 degrees C, the network was shrunk and the contraction obtained lengthwise and the longitudinal direction, and the loft sheet that both has about 10% of irregularity.

[0032] They are 1.5 deniers of example of comparison 1 polyester fibers, and 51mm with the card of a conventional method Basis-weight 10 g/m2 The fiber aggregate is formed, ten layers (basis-weight 100 g/m2) were wrapped (not shown), and the fiber aggregate was made to interlace by water needling. For the water pressure of water needling, 40 kg/cm2 and a nozzle pitch are 1.6mm and speed 5 m/min in that case. It carried out.

[0033] The conditions of the examples 1 and 2 and the example of comparison which were mentioned above were summarized in the following table 1.

[0034]

[Table 1]

		厚み (mm)	坪量 (g/m²)	密度 (g/cm³)	柔軟性 (mm) (CD-MD)
実施例	1	2．5	100	0．040	51－51
	2	2．5	100	0．040	47－48
比較例		1．0	100	0．100	56－100

Although thickness was obtained by piling up ten nonwoven fabrics, it is the average per sheet. Density was computed from thickness and the basis weight, as shown in the following formula.
[0035] Density = basis-weight/(thickness x1000)
Flexibility was measured according to the cantilever method (JIS L-1085, 5.7A). In addition, the inside MD of Table 1 is a flow direction, and CD is the direct direction. The comparison examination which tries the effect about an example 1 and the example of comparison was performed among the above-mentioned example and the example of comparison. In this examination, the uptake nature was investigated about various kinds of dust, i.e., **** stiffness, crumbs, and hair, using the sheet obtained in the example 1 and the example of comparison as a sheet for cleaning. The result is shown in the following table 2.
[0036]
[Table 2]

	熱収縮率（%）		ダストの種類と捕集性		
	縦	横	綿ぼこり	パンくず	毛　髪
実施例1	10	10	◎	○	○
比較例1	0	0	○	×～△	△

Evaluation [of dust uptake nature] O; The uptake nature which is completely satisfactory O; Although a problem twists mostly and being carried out a uptake nature **; uptake, remain considerably. x; -- Table 2 which hardly carries out a uptake -- since -- the case where the loft sheet by this invention is used for a cleaning sheet so that clearly -- **** stiffness, crumbs, and all the hair -- the former -- uptake nature -- good -- a fine potato like **** stiffness -- the thing of a non-theory -- A comparatively big contaminant like crumbs was also able to be caught, and a long thing like hair could also be caught, and the dust of the large range which is not in the conventional sheet for cleaning was able to be cleaned.
[0037] Moreover, as compared with the sheet for cleaning which depends for the conventional dust adsorption power on an oily medicine, the cleaning sheet by this invention can decrease the quantity of the amount of oily medicines to apply. Therefore, an oily medicine shifts to a cleaning side, deterioration and discoloration can be caused to a cleaning side or problems, such as shift to the hand of an oily medicine, can also be held down to it to the minimum.
1.5 deniers of example 3 polyester fibers, and 51mm -- the card of a conventional method -- basis-weight 10 g/m2 the fiber aggregate -- forming -- the fiber aggregate -- three layers (30g/m2) -- wrapping (not shown) -- carrying out -- a hole -- 10mm of crevices during diameter puncturing of 30mm -- circular -- eyes 20 g/m2 which consists of polypropylene / the reforming polypropylene fiber aggregate

of a hole After carrying out the laminating of this fiber aggregate to a reticulated sheet at the upper layer, it was made For the water pressure of water needling, 40 kg/cm2 and a nozzle pitch are 1.6mm and speed 5 m/min in that case. It carried out. Then, by 130-degree C hot blast, by heat-treating for 50 seconds, the reticulated sheet was shrunk simultaneously with dryness and the contraction obtained lengthwise and the longitudinal direction, and the loft sheet that both has about 10% of irregularity.
[0038] They are 1.5 deniers of example of comparison 2 polyester fibers, and 51mm with the card of a conventional method Basis-weight 10 g/m2 The fiber aggregate is formed, eight layers (basis-weight 80 g/m2) were wrapped (not shown), and the fiber aggregate was made to interlace by water needling. For the water pressure of water needling, 40 kg/cm2 and a nozzle pitch are 1.6mm and speed 5 m/min in that case. It carried out.
[0039] The conditions of the example 3 and the example 2 of comparison which were mentioned above were summarized in the following table 3.
[0040]
[Table 3]

	厚み (mm)	坪量 (g/m²)	密度 (g/cm³)	柔軟性 (mm) (CD-MD)
実施例3	10.0	78	0.0078	30−30
比較例2	0.8	80	0.1	50−70

They are 1.5 deniers of example 4 polyester fibers, and 51mm with the card of a conventional method Basis-weight 8 g/m2 The fiber aggregate is formed. The fiber aggregate is wrapped at five layers (40 g/m2) (not shown). After making into the interlayer the film (15 micrometers in 10mm of apertures, and 3mm thickness of crevices during puncturing) which has puncturing of polypropylene which carries out biaxial contraction as a reticulated sheet and making the laminating of this fiber aggregate to a vertical layer, it was made to interlace by water needling. For the water pressure of water needling, 40 kg/cm2 and a nozzle pitch are 1.6mm and speed 5 m/min in that case. It carried out. Then, by 130-degree C hot blast, by heat-treating for 50 seconds, the reticulated sheet was shrunk simultaneously with dryness and the contraction obtained lengthwise and the longitudinal direction, and the loft sheet that both has about 10% of irregularity.
[0041] The conditions of this example are shown in the following table 4.
[0042]
[Table 4]

	厚み (mm)	坪量 (g/m²)	密度 (g/cm³)	柔軟性 (mm) (CD-MD)
実施例4	2.6	100	0.038	50−50

the Ming kana from above-mentioned Table 3 and 4 -- like, according to the above-mentioned examples 3 and 4, in fiber density and flexibility, the above-mentioned example 2 of comparison was excelled, it was flexible and the good loft sheet of the touch was able to be obtained
[0043]
[Effect of the Invention] It has predetermined intensity, and the loft sheet of this invention is flexible and its touch is good. Moreover, according to the manufacture method of loft sheet ** of this invention, the

above-mentioned bulky sheet can be manufactured suitably. Furthermore, since this invention gives a loft uniform as nonwoven blanket-like the whole fiber web itself and whole sheet which constitute a sheet, it can raise the flexibility of fiber remarkably and can give a practical strength for the nonwoven blanket-like fiber aggregate portion to which the degree of interlacement became low with a reticulated sheet.

[0044] Since the front face of a loft sheet is made to discover the shape of flexible toothing when it uses as a sheet for cleaning especially, the dust which touches a sheet can be carried out be easy to be involved. Moreover, although the wavelike upheaval discovered since the confounding of the nonwoven blanket-like fiber aggregate was including the whole to the conventional contractile sheet-like object became small, by using a reticulated sheet as a contractile sheet, this invention enlarges wavelike upheaval more, raises a loft, and can make feeling good further.

[Translation done.]